

**What is claimed is;**

1. An etching method for plasma-etching an  $\text{SiO}_2$  film layer covering an  $\text{SiN}_x$  film layer formed at a workpiece placed inside an air-tight processing chamber by raising to plasma a processing gas induced into said processing chamber, wherein;

said processing gas is a mixed gas containing at least  $\text{C}_4\text{F}_8$  and  $\text{CH}_2\text{F}_2$ .

2. An etching method for plasma-etching an  $\text{SiO}_2$  film layer covering an  $\text{SiN}_x$  film layer formed at a workpiece placed inside an air-tight processing chamber by raising to plasma a processing gas induced into said processing chamber, comprising;

a first step in which said  $\text{SiO}_2$  film layer is etched by using a mixed gas containing at least  $\text{C}_4\text{F}_8$  and  $\text{CO}$  as said processing gas; and

a second step in which a switch is made to a mixed gas containing at least  $\text{C}_4\text{F}_8$  and  $\text{CH}_2\text{F}_2$  to be used as said processing gas to etch said  $\text{SiO}_2$  film layer immediately before said  $\text{SiN}_x$  film layer becomes exposed.

3. An etching method for plasma-etching an  $\text{SiO}_2$  film layer covering an  $\text{SiN}_x$  film layer formed at a workpiece placed inside an air-tight processing chamber by raising to plasma a processing gas induced into said processing chamber, comprising;

a first step in which said  $\text{SiO}_2$  film layer is etched by using a mixed gas containing at least  $\text{C}_4\text{F}_8$  and  $\text{CO}$  as said processing gas; and

a second step in which a switch is made to a mixed gas containing at least  $\text{C}_4\text{F}_8$  and  $\text{CH}_2\text{F}_2$  to be used as said processing gas to etch said  $\text{SiO}_2$  film layer immediately after said  $\text{SiN}_x$  film layer becomes exposed.

4. An etching method according to any of claims 1, 2 and 3, wherein;

the flow rate ratio ( $\text{CH}_2\text{F}_2 / \text{C}_4\text{F}_8$ ) of  $\text{C}_4\text{F}_8$  and  $\text{CH}_2\text{F}_2$  in said mixed gas containing at least  $\text{C}_4\text{F}_8$  and  $\text{CH}_2\text{F}_2$  is set essentially within a range of 0.4 ~ 1.0.

5. An etching method according to any of claims 1, 2 and 3, wherein;

the partial pressure corresponding to  $\text{C}_4\text{F}_8$  relative to the entire pressure of said mixed gas containing at least  $\text{C}_4\text{F}_8$  and  $\text{CH}_2\text{F}_2$  is set essentially within a range of 0.4 (mTorr) ~ 0.8 (mTorr).

6. An etching method according to any of claims 1, 2 and 3, wherein;

the density of plasma excited inside said processing chamber is set essentially within a range of  $1.5 \times 10^{10}$  (number of ions /  $\text{cm}^3$ ) ~  $1.2 \times 10^{11}$  (number of ions /  $\text{cm}^3$ ).

7. An etching method according to any of claims 1, 2 and 3, wherein;

said workpiece is placed on a mounting surface of a susceptor provided inside said processing chamber; and

the temperature of said susceptor is set essentially within a range of 20 °C ~ the heat resistance temperature of a photoresist layer constituting a mask pattern for said  $\text{SiO}_2$  film layer.

8. An etching method according to any of claims 1, 2 and 3, wherein;

said mixed gas containing at least  $C_4F_8$  and  $CH_2F_2$  further contains an inert gas.

9. An etching method according to claim 2 or 3, wherein;

said mixed gas containing at least  $C_4F_8$  and CO further contains an inert gas.